REMARKS

35 U.S.C. §103 rejections

With reference to pages 2-4 of the Office Action, claims 1, 3, 5, 6, 8-12, 15, 16, 18-21, 28, 31, 32 and 35-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Zarian et al (US 5,937,127) in view of Daniel (US 4,466,697).

The Examiner has substantially reiterated his views on Zarian and, once again, refers to figures 4-6 of Zarian as disclosing a side-scattering light guide comprising, amongst other things, "particles within the core, the particles being transparent, high optical transmittance low back reflectance and low [sic], and being distributed to scatter light being transmitted along the core so that at least some of the scattered light exits the sides of the core". The Examiner admits that Zarian does not specifically disclose the use of diffuser particles.

Zarian discloses the use of a number of jacket layers around a light transmitting core cladded with a fluoropolymer to create an "aura effect" whereby a fiber-optic conduit can be made to appear larger than it actually is. Zarian's disclosure, therefore, is directed towards a completely different problem to that of the Applicant.

Importantly, as the Applicant has already pointed out in the previous response, Zarian does not disclose the use of particles within the core as asserted by the Examiner. Zarian is completely silent on any form of particles within

the light transmitting polymeric core. All of the embodiments discussed have a core which is cladded with a fluoropolymer cladding. This is then surrounded by a first jacket which itself may be surrounded by "an interlacing layer having an optical characteristic" (column 4 lines 42-45). Column 5 lines 3-4 also sets out that "the optical characteristic in the interlaced layer may be affected by the aura effect" as does column 5 lines 47-49 "the interlacing layer interposed between multiple layers of jackets desirably comprises an optical characteristic that is affected by the aura effect".

It should now be clear that it is the interlacing layer only which contains the optical characteristic and that this is separated from the core by a cladding layer and a first jacket. The Examiner in his report refers to column 3 lines 15-19 of Zarian as indicating particles within the core. With respect, this is not a correct reading of Zarian.

The optical characteristic is also never described as necessarily having the properties of "being transparent, high optical transmittance low back reflectance and low [sic], and being distributed to scatter light being transmitted along the core so that at least some of the scattered light exits the sides of the core" i.e. all the properties of the diffuser particles of the present application which the Examiner has attributed to Zarian.

The optical characteristics of Zarian may be reflectors, reflective particles, dichroics etc as set out above. Column 4 lines 45-48 describe the interlacing layer having the optical characteristic as preferably being "a thin film which can be formed either continuously along the

length of the fiber-optic conduit or at discrete intervals". This optical characteristic clearly cannot serve the same purpose as the diffuser particles of the present application.

The Examiner has also re-asserted that claim 18 of the present application is made obvious in light of the jackets of Zarian being "made of reflective materials or films". This point was addressed in the Applicant's previous response but will be repeated here for the sake of clarity. The only disclosure in Zarian relating to reflective materials or films is the interlacing layer, as previously described. The jackets employed by Zarian are only ever described as being a "transparent or translucent polymeric jacket" (column 7 lines 14-18). The provision of a number of these jackets with different refractive indices allows the light produced to give an aura effect around the conduit. It would be undesirable for the light conduits of Zarian to have reflective jackets and there is no disclosure of this feature.

The Examiner then alleges that Daniel discloses the use of "diffuser particles (40) having refractive indices which are close to the refractive index of a waveguide core (diffuser "bubbles" are made from the same material as the core)". The Examiner then asserts that it would have been obvious to combine the diffuser particles of Daniel into the invention of Zarian. The Applicant respectfully disagrees.

Daniel is directed towards solving the problem of the light emitted from the uncladded portions of optical fibres being strongly forward focused and hence resulting in the

appearance of dim light when the fibre is viewed at perpendicular angles.

Daniel teaches the use of light scattering particles to aid in the redirection of light, in a perpendicular manner, to thereby leave the optical fibre at an angle which means it appears bright when the fibre is viewed side-on. This is achieved by the use of particles which have a "relatively higher or lower index of refraction than the core material" (column 3 lines 48-49). On a plain reading this clearly indicates that the particles and core material cannot be of the same refractive index and strongly suggests that the difference between the two must not be inconsiderable. This interpretation is strengthened by every example and further description disclosed by Daniel.

At column 3, lines 54-65, Daniels sets out that "not all types of scattering particles will be equally effective in scattering the light from optical fibre cores, and perpendicular scattering is the most desirable". Clearly, scattering of light at angles as great as perpendicular to its direction of travel, by the light scattering particles, is impossible if the particles and core have similar refractive indices.

Daniel then goes on to say "clearly, granules of transparent refractive material are the least effective in meeting the desired scattering criteria, as refractive granules, even those having indexes of refraction very different from the core material, tend to scatter light in the forward direction at relatively low angles". This is a clear statement to the effect that transparent refractive particles are not desirable and even refractive particles

with very different refractive indices from that of the core material still do not refract light at a sufficient enough angle for the purposes of Daniel. The teaching of Daniel is, therefore, that if refractive particles are to be used at all (reflective particles are preferred) then they must have indices of refraction very different from that of the core material as angles of scattering close to perpendicular are required.

This necessity of scattering light at large angles is further reinforced at column 6, lines 11-15, where Daniel describes, in relation to light scattered at perpendicular angles, that "this is a very desirable feature of the present invention as contrasted to various methods…previously known which operate to scatter light at shallow angles".

In contrast to all the teaching of Daniel above, the present specification sets out, at page 7 lines 6-8, that "the diffuser particles 4 must have a high transmittance, low back reflectance, low absorbance and a refractive index that is a close match to that of the core 3." Further, lines 24-25 state that "a light ray, such as 12, will strike a diffuser particle 4 and undergo a small deviation, at most a few degrees". Larger, perpendicular angles of deviation are not desirable for the present invention as they will produce light with an aesthetically unpleasing appearance, as set out in the background art section. The teaching of Daniel in relation to the light scattering particles is, therefore, in direct opposition to that of the present invention.

Claim 1 of the present application also refers to "diffuser particles being transparent, having a refractive

index close to that of the core". Daniel's teaching, in relation to transparent refractive particles as set out above, is, firstly, that they are the least effective choice and, secondly, that if they are used then the greater the difference in refractive index between them and the core material, the better the result will be. A person skilled in the art would not, therefore, be motivated to combine the teaching of light scattering particles from Daniel into the invention of Zarian to come up with the present invention, as defined in the claims, since they would be strongly directed away from using transparent diffuser particles with a refractive index close to that of the core material, by the teaching of Daniel.

The Examiner states that Daniel discloses diffuser particles having refractive indices which are close to the refractive index of a waveguide core and diffuser bubbles which are made from the same material as the core. With respect, this is not a correct reading of Daniel. As described above, Daniel strongly teaches that the refractive indices of particles and core should be substantially different and the Applicant can find no disclosure, example or otherwise, which states that they can be of the same material. The only mention of "bubbles" is at column 3, line 50, which states that the transparent particles, if used, could be air bubbles. Clearly, the core material is not also intended to be air. If the particles and core in Daniel where of the same material then the stated objective of directing light at perpendicular angles simply could not be achieved.

The preferred materials for the particles of Daniel are "thin flakes of silver or aluminium" as they "make excellent

light scattering particles since they provide a high amount of perpendicular scatter as well as a high amount of back scatter" (column 4, lines 12-15). The teaching towards these kinds of materials is clearly very different from the transparent diffuser particles of the present application having a refractive index close to that of the core, as defined in claim 1.

Therefore, it has been demonstrated that Zarian does not disclose any elements having all the features of the Applicant's diffuser particles. Daniel, also, does not teach towards the use of transparent diffuser particles with refractive indices close to that of the core. Rather, Daniel teaches the use of light scattering particles which are reflective or at least have substantially different refractive indices from that of the core so as to enable the scattering of light at perpendicular angles. Daniel, therefore, teaches away from the use of transparent diffuser particles which effect only slight deviations in the path of an incident light ray, as employed in the present invention.

Given the situation described above it should be appreciated that the use of transparent diffuser particles in an optically transmitting core with a refractive index close to that of the core, as in the present application, would not have been obvious to a person skilled in the art who was aware of the disclosure of Zarian and Daniel.

In light of the arguments presented above, it is submitted that all independent claims and the claims dependent thereon are both novel and non-obvious to a person skilled in the art at the time the invention was made in light of the prior art of record.

In light of the above remarks, it is submitted that the application is in condition for allowance. Reconsideration and allowance of the application is courteously solicited.

Respectfully submitted,

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